CATERPILLAR

Operation and Maintenance Manual

428D BACKHOE LOADER

S/N BMT01618-03227

Tip; Use Bookmarks panel to navigate

Printed by Heavy Equipment Manuals
v2.20

Printed in U.S.A

Heavy Equipment Manuals

Foreword 2
Operation Section 6
Maintenance Section 203
Reference Information Section 359
Product Information Section 366
Reference Material 403

Product: BACKHOE LOADER
Model: 428D BACKHOE LOADER BMT
Configuration: 428D Backhoe Loader BMT01618-03227 (MACHINE) POWERED BY 3054 Engine

Operation and Maintenance Manual
424D, 428D and 438D Backhoe Loaders

Media Number -SEBU7400-02 **Publication Date -01/06/2006** **Date Updated -28/06/2006**

s00037320

Foreword

Literature Information

This manual should be stored in the operator's compartment in the literature holder or seat back literature storage area.

This manual contains safety information, operation instructions, transportation information, lubrication information and maintenance information.

Some photographs or illustrations in this publication show details or attachments that can be different from your machine. Guards and covers might have been removed for illustrative purposes.

Continuing improvement and advancement of product design might have caused changes to your machine which are not included in this publication. Read, study and keep this manual with the machine.

Whenever a question arises regarding your machine, or this publication, please consult your Cat dealer for the latest available information.

Safety

The safety section lists basic safety precautions. In addition, this section identifies the text and locations of warning signs and labels used on the machine.

Read and understand the basic precautions listed in the safety section before operating or performing lubrication, maintenance and repair on this machine.

Operation

The operation section is a reference for the new operator and a refresher for the experienced operator. This section includes a discussion of gauges, switches, machine controls, attachment controls, transportation and towing information.

Photographs and illustrations guide the operator through correct procedures of checking, starting, operating and stopping the machine.

Operating techniques outlined in this publication are basic. Skill and techniques develop as the operator gains knowledge of the machine and its capabilities.

Maintenance

The maintenance section is a guide to equipment care. The Maintenance Interval Schedule (MIS) lists the items to be maintained at a specific service interval. Items without specific intervals are listed under the "When Required" service interval. The Maintenance Interval Schedule lists the page number for the step-by-step instructions required to accomplish the scheduled maintenance. Use the Maintenance Interval Schedule as an index or "one safe source" for all maintenance procedures.

Maintenance Intervals

Use the service hour meter to determine servicing intervals. Calendar intervals shown (daily, weekly, monthly, etc.) can be used instead of service hour meter intervals if they provide more convenient servicing schedules and approximate the indicated service hour meter reading. Recommended service should always be performed at the interval that occurs first.

Under extremely severe, dusty or wet operating conditions, more frequent lubrication than is specified in the maintenance intervals chart might be necessary.

Perform service on items at multiples of the original requirement. For example, at every 500 service hours or 3 months, also service those items listed under every 250 service hours or monthly and every 10 service hours or daily.

California Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

Battery posts, terminals and related accessories contain lead and lead compounds. **Wash hands after handling.**

Certified Engine Maintenance

Proper maintenance and repair is essential to keep the engine and machine systems operating correctly. As the heavy duty off-road diesel engine owner, you are responsible for the performance of the required maintenance listed in the Owner Manual, Operation and Maintenance Manual, and Service Manual.

It is prohibited for any person engaged in the business of repairing, servicing, selling, leasing, or trading engines or machines to remove, alter, or render inoperative any emission related device or element of design installed on or in an engine or machine that is in compliance with the regulations (40 CFR Part 89). Certain elements of the machine and engine such as the exhaust system, fuel system, electrical system, intake air system and cooling system may be emission related and should not be altered unless approved by Caterpillar.

Machine Capacity

Additional attachments or modifications may exceed machine design capacity which can adversely affect performance characteristics. Included would be stability and system certifications such as brakes, steering, and rollover protective structures (ROPS). Contact your Cat dealer for further information.

Cat Product Identification Number

Effective First Quarter 2001 the Cat Product Identification Number (PIN) has changed from 8 to 17 characters. In an effort to provide uniform equipment identification, Caterpillar and other construction equipment manufacturers are moving to comply with the latest version of the product identification numbering standard. Non-road machine PINs are defined by ISO 10261. The new PIN format will apply to all Cat machines and generator sets. The PIN plates and frame marking will display the 17 character PIN. The new format will look like the following:

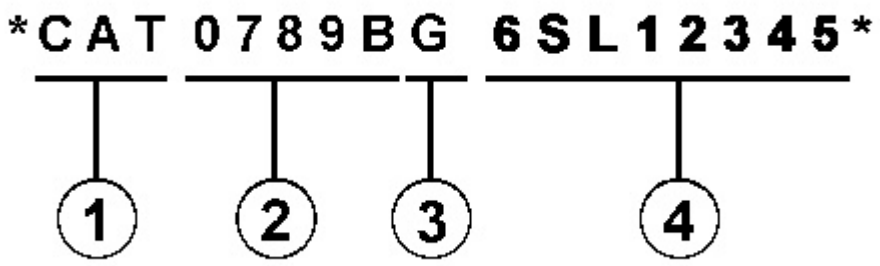


Illustration 1 g00751314

Where:

1. Caterpillar's World Manufacturing Code (characters 1-3)

2. Machine Descriptor (characters 4-8)

3. Check Character (character 9)

4. Machine Indicator Section (MIS) or Product Sequence Number (characters 10-17). These were previously referred to as the Serial Number.

Machines and generator sets produced before First Quarter 2001 will maintain their 8 character PIN format.

Components such as engines, transmissions, axles, etc. and work tools will continue to use an 8 character Serial Number (S/N).

This is the sample of the manual

Click on the download link for complete manual

Download Link

Copyright 1993 - 2022 Caterpillar Inc.
All Rights Reserved.
Private Network For SIS Licensees.

Mon Aug 1 16:36:47 UTC+0530 2022

Accelerator Control 4
Alert Indicators 6
All Wheel Drive and All Wheel Braking Control - If Equipped 10
All Wheel Drive Control - If Equipped 12
All Wheel Steer Control - If Equipped 13
Alternate Exit 18
Autoshift Control - If Equipped 20
Backhoe Auxiliary Control (Foot Operated) - If Equipped 22
Backhoe Extendable Stick Control (Foot Operated) 23
Backhoe Operation 25
Backhoe Stabilizer Controls 33
Backup Alarm 36
Boom Transport Lock 37
Bucket Positioner 40
Cab Door 43
Changing Direction and Speed 45
Daily Inspection 46
Differential Lock Control - If Equipped 48
Directional Turn Signal Control 50
Engine and Machine Warm-Up 52
Engine Start Switch 54
Engine Starting with Jump Start Cables 56
Engine Starting with Starting Aid 59
Engine Starting 62
Equipment Lowering with Engine Stopped - Mechanical Controls 64
Extendable Stick Lock Control 70
Gauges 72
Hazard Flasher Control 74
Heating and Air Conditioning Control - If Equipped 75
Horn 78

Installation of Bucket Stop - If Equipped 80
Joystick Control (Loader) 82
Leaving the Machine 84
Lifting and Tying Down the Machine 86
Light Switches - If Equipped 88
Machine Security System - If Equipped 92
Mirror 94
Mounting and Dismounting 95
Multipurpose Controls 97
Operating Technique Information 99
Operation Information 101
Operator Station 103
Parking Brake Control 107
Parking Brake 109
Quick Coupler Control (Loader) - If Equipped 111
Quick Coupler Operation (Backhoe) - Pin Grabber Quick Coupler (If Equipped) 114
Quick Coupler Operation (Loader) 123
Ride Control 128
Roading the Machine 131
Rotating Beacon Light 132
Seat Belt 133
Seat 139
Service Brake Control 145
Shipping the Machine 148
Sideshift Lock Control - If Equipped 152
Starting Aid 153
Steering Column Tilt Control 155
Steering Control 156
Stopping the Engine if an Electrical Malfunction Occurs 157

Stopping the Engine 159
Stopping the Machine 161
Swing Lock Pin Control 163
Towing the Machine 165
Transmission Direction and Speed Control - Autoshift Transmissions Only 170
Transmission Direction Control (Direct Drive) 173
Transmission Neutral Lock Control 175
Transmission Speed Control (Direct Drive) 178
Transport Position 180
Two Lever Control (Backhoe)(Excavator Pattern) 183
Two Lever Control (Backhoe)(Universal Pattern) 186
Vandalism Guard (Rotating Gauge Panel) - If Equipped 192
Window Wiper and Washer Control - If Equipped 194
Windows 196

Product: BACKHOE LOADER
Model: 428D BACKHOE LOADER BMT
Configuration: 428D Backhoe Loader BMT01618-03227 (MACHINE) POWERED BY 3054 Engine

Operation and Maintenance Manual
424D, 428D and 438D Backhoe Loaders
Media Number -SEBU7400-02 **Publication Date -01/06/2006** **Date Updated -28/06/2006**

i01453312

Accelerator Control

SMCS - 1265; 1276

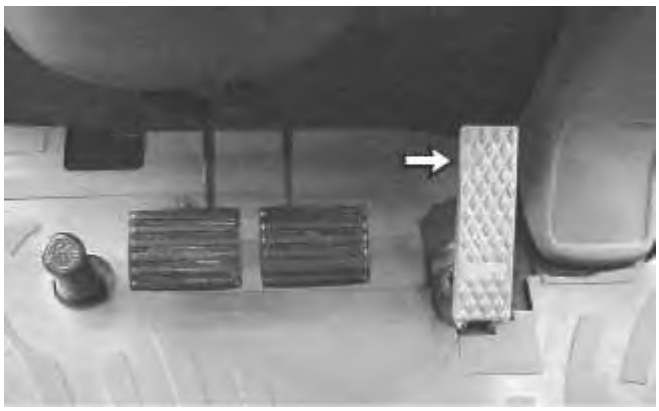


Illustration 1 g00732046

Accelerator Pedal - Push down the pedal in order to increase travel speed. Release the pedal in order to decrease travel speed. The accelerator pedal will return to the low idle setting.

Use the pedal to reduce engine rpm for directional shifts when you use the loader.

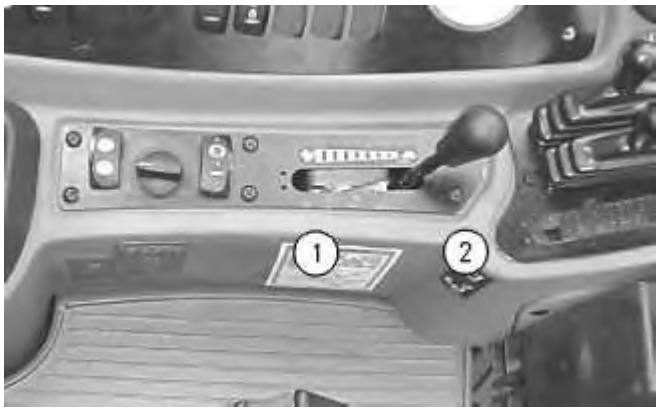


Illustration 2 g00730721

Accelerator Lever - This lever controls the engine speed for backhoe operation.

Operate the machine in the green operating range on the tachometer.

High Idle - Move the lever to position (1) for a faster idle speed.

Low Idle - Move the lever to position (2) for a lower idle speed.

For roading or loader operation, keep the lever in the position (2). Use the accelerator pedal to change the engine speed.

Note: The maximum recommended operating engine speed is 2100 rpm.

Copyright 1993 - 2022 Caterpillar Inc.
All Rights Reserved.
Private Network For SIS Licensees.
Mon Aug 1 16:42:44 UTC+0530 2022

Product: BACKHOE LOADER
Model: 428D BACKHOE LOADER BMT
Configuration: 428D Backhoe Loader BMT01618-03227 (MACHINE) POWERED BY 3054 Engine

Operation and Maintenance Manual
424D, 428D and 438D Backhoe Loaders

Media Number -SEBU7400-02 **Publication Date -01/06/2006** **Date Updated -28/06/2006**

i01860129

Alert Indicators

SMCS - 7450; 7451

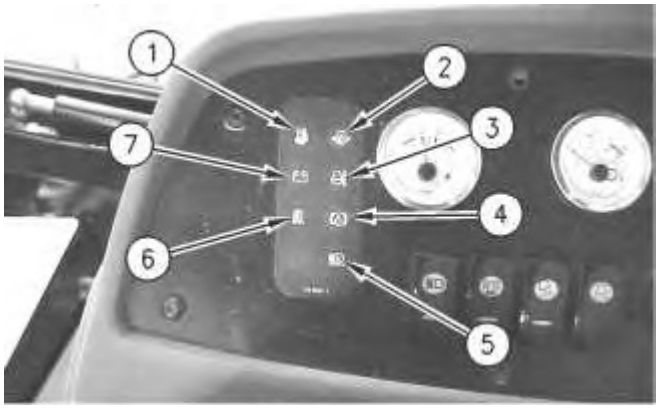


Illustration 1 g00731962

Fuel System Water Separator (1) (If Equipped) - The alert indicator indicates a plugged fuel/water separator. If this alert indicator comes on during operation, stop the machine immediately and engage the parking brake. Stop the engine and investigate the cause of the fault.

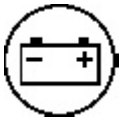
Engine Oil Pressure (2) - The alert indicator will light when the engine oil pressure is low. If this alert indicator comes on, stop the machine immediately. Stop the engine and investigate the cause.

Engine Coolant (3) - The alert indicator will light and an audible alarm will sound when the engine coolant temperature is too high. If this alert indicator comes on, stop the machine immediately. Stop the engine and investigate the cause.

Brake Oil Level (4) - The alert indicator will light and an audible alarm will sound when the brake reservoir oil is low. If this alert indicator comes on, stop the machine immediately. Investigate the cause and add oil to the correct level. Do not operate the machine if the indicator light stays on.

Air Filter Indicator (5) (If Equipped) - The alert indicator will light when the air filter becomes clogged. If this alert indicator comes on, stop the machine and investigate the cause.

Hydraulic Oil Filter (6) (If Equipped) - The alert indicator indicates a plugged hydraulic oil filter. If this alert indicator flashes during operation, stop the machine immediately and engage the parking brake. Stop the engine and investigate the cause of the fault.



Charging System (7) - The alert indicator comes on if there is a malfunction in the electrical system. If this alert indicator comes on, the system voltage is too high for normal machine operation or too low for normal machine operation.

If electrical loads (air conditioning and/or lighting) are high and the engine speed is near idle, increase the engine speed to high idle. This will generate more output from the alternator. If the alert indicator for the electrical system turns off within one minute, the electrical system is probably operating in a normal manner. However, the electrical system may be overloaded during periods of low engine speeds.

Modify the operating cycle in order to prevent overloading the electrical system and discharging the batteries.

Low idle must be set correctly. Adjust for the high side of the Low Idle specification while the most often used electrical loads are turned on. In order to reduce the loads, use the Medium fan speed instead of the High fan speed.

If this procedure does not cause the alert indicator to turn off, move to a convenient location. Investigate the cause (loose alternator belt, broken alternator belt, faulty batteries, etc).

If the engine speed is near operating speeds and if the electrical loads are light, the alert indicator may remain on. If the alert indicator remains on, move to a convenient location. Investigate the cause (loose alternator belt, broken alternator belt, faulty batteries, etc).

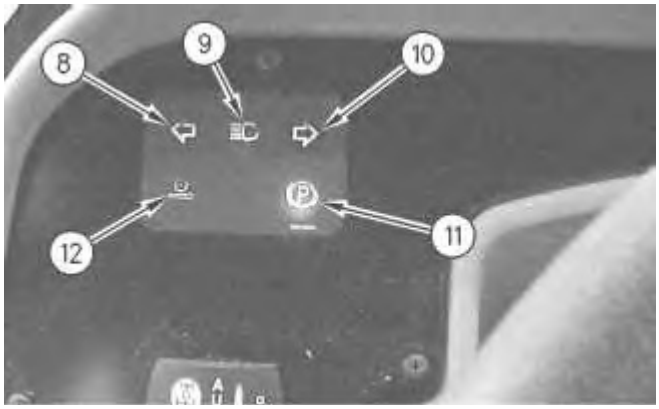
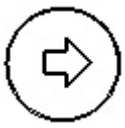


Illustration 2 g00726012

Left Turn Signal (8) - The alert indicator will flash when the left turn signal is activated.

High Beams (9) - The alert indicator will light when you press the top of the dimmer switch. The alert indicator should go out when you press the bottom of the dimmer switch.



Right Turn Signal (10) - The alert indicator will flash when the right turn signal is activated.

Parking Brake (11) - The alert indicator will light and an audible alarm will sound when the parking brake is engaged and the transmission is put into forward or reverse. The

alert indicator should come on during start-up. The alert indicator should go out when the parking brake is released.

Ride Control (12) - The alert indicator will light when the ride control is activated.

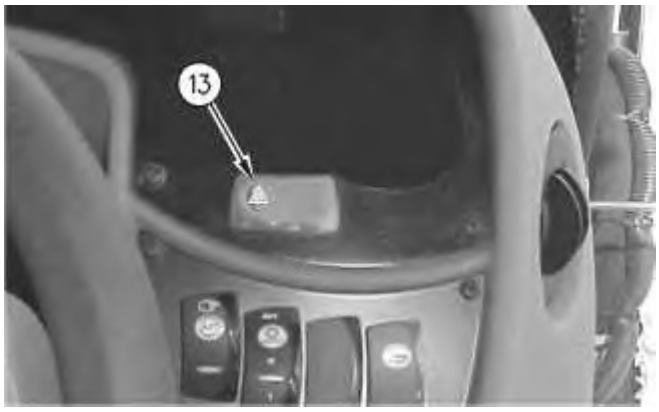


Illustration 3 g00735342

Hazard (13) - The alert indicator will flash and the turn signals will flash when the hazard flashers are activated.

Copyright 1993 - 2022 Caterpillar Inc.
All Rights Reserved.
Private Network For SIS Licensees.

Product: BACKHOE LOADER
Model: 428D BACKHOE LOADER BMT
Configuration: 428D Backhoe Loader BMT01618-03227 (MACHINE) POWERED BY 3054 Engine

Operation and Maintenance Manual
424D, 428D and 438D Backhoe Loaders
Media Number -SEBU7400-02 **Publication Date -01/06/2006** **Date Updated -28/06/2006**

i01359655

All Wheel Drive and All Wheel Braking Control - If Equipped

SMCS - 4250; 4810

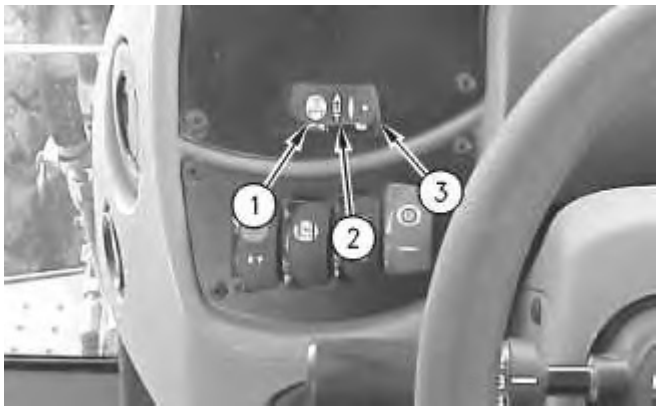


Illustration 1 g00729756

All Wheel Drive (1) - Push the left side of the switch to the ON position in order to activate all wheel drive.

All Wheel Drive can be activated anytime when additional traction is desired.

All Wheel Drive should always be activated when you are operating the machine on a slope.

All Wheel Drive Braking (2) - Place the switch in the middle position in order to enable the All Wheel Drive Braking. The machine will operate in two-wheel drive until you push on the brake pedals. Pushing on the brake

pedals will activate the All Wheel Drive.

Note: For machines that are equipped with two-wheel steer, you must press on both of the brake pedals at the same time in order to enable the All Wheel Drive Braking. Steering using the brakes is still possible for two-wheel steer machines, when you press one brake pedal.

All Wheel Drive Braking should always be activated when you are roading the machine.

OFF (3) - Push the right side of the switch to the OFF position for two-wheel drive. The All Wheel Drive Braking is deactivated when the switch is in this position.

Copyright 1993 - 2022 Caterpillar Inc.
All Rights Reserved.
Private Network For SIS Licensees.
Mon Aug 1 16:44:18 UTC+0530 2022

Product: BACKHOE LOADER
Model: 428D BACKHOE LOADER BMT
Configuration: 428D Backhoe Loader BMT01618-03227 (MACHINE) POWERED BY 3054 Engine

Operation and Maintenance Manual
424D, 428D and 438D Backhoe Loaders
Media Number -SEBU7400-02 **Publication Date -01/06/2006** **Date Updated -28/06/2006**

i01376255

All Wheel Drive Control - If Equipped

SMCS - 4810

Illustration 1 g00731986

All Wheel Drive (1) - Push the left side of the switch in order to activate all wheel drive. Push the right side of the switch for two-wheel drive mode.

All Wheel Drive can be activated anytime when additional traction is desired.

All Wheel Drive should always be activated when you are operating the machine on a slope.

Copyright 1993 - 2022 Caterpillar Inc.
All Rights Reserved.
Private Network For SIS Licensees.

Product: BACKHOE LOADER
Model: 428D BACKHOE LOADER BMT
Configuration: 428D Backhoe Loader BMT01618-03227 (MACHINE) POWERED BY 3054 Engine

Operation and Maintenance Manual
424D, 428D and 438D Backhoe Loaders
Media Number -SEBU7400-02 **Publication Date -01/06/2006** **Date Updated -28/06/2006**

i01443046

All Wheel Steer Control - If Equipped

SMCS - 7332

WARNING

Personal injury or death can result if the machine is roaded in any mode other than front wheel steer.

Always road the machine with the rear wheels centered and the machine in the front wheel steer mode.

The All Wheel Steer (AWS) has three steering modes: All Wheel Steer, Two-Wheel Steer and an Independent Rear Maneuvering mode. When you operate the machine for the first time, become familiar with the three modes by trying each one. This should be done in an area that is clear of personnel and of obstacles.

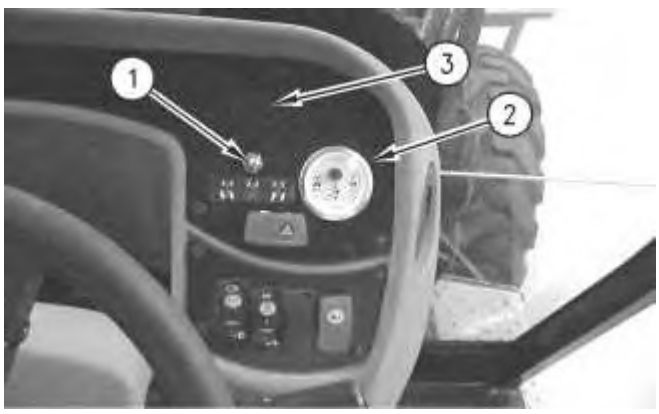


Illustration 1 g00756057

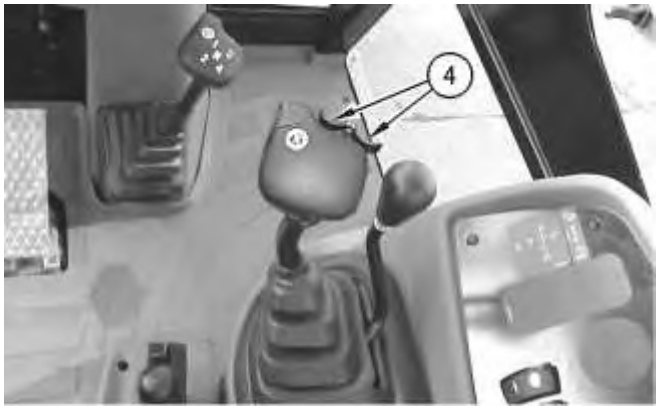


Illustration 2 g00756061

The All Wheel Steer mode consists of the following components:

- an All Wheel Steer switch (1) that allows the operator to choose from the three modes
- a rear axle position gauge (2)
- an alert indicator (3)
- an independent rear maneuvering switch (4)

Three modes provide maximum machine performance under various conditions at the job site.

Illustration 3 g00756058

Two-Wheel Steer - The Two-Wheel Steer mode (5) offers the capability to operate the machine on the road. The Two-Wheel Steer mode is used when additional maneuvering capability is not needed. Only the front axle is used to steer the machine. Use this mode when you are roading the machine.

When you are operating the machine in this mode the indicator light (3) will not be on.

All Wheel Steer - The All Wheel Steer mode (6) allows the operator to choose independent rear maneuvering for positioning the rear axle and for controlling the rear axle. The switch that is located on the loader control lever is used for positioning and for controlling the rear axle. When you are operating the machine in the All Wheel Steer mode, the indicator light (3) will be on.

Illustration 4 g00283347

Pull the independent rear maneuvering switch (4) to the right. The wheels will move the back of the machine to the left when the machine is moving in a forward direction.

Illustration 5 g00283349

Pull the independent rear maneuvering switch (4) to the left. The wheels will move the back of the machine to the right when the machine is moving in a forward direction.

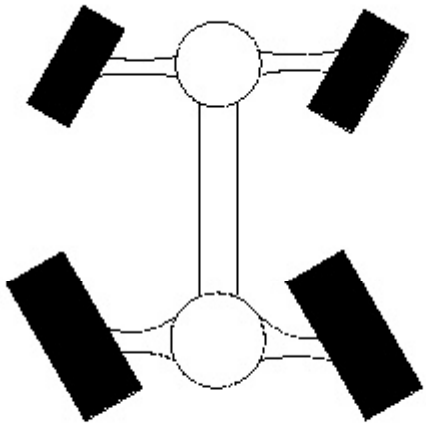


Illustration 6 g00282686

Position the front wheels and back wheels in opposite directions in order to maneuver around a very tight corner.

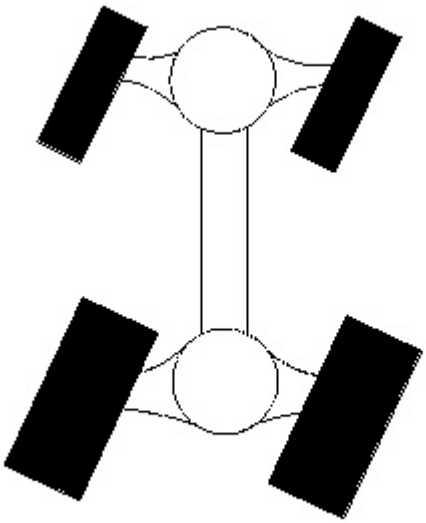


Illustration 7 g00282687

Position the front wheels and back wheels in the same direction for crab steering.

Circle Steer Mode - The Circle Steer Mode (7) provides reduced turning radii and tighter operation in confined spaces. The front and rear axles are used to steer the machine. When you are operating the machine in the Circle Steer mode, the indicator light (3) will come on.

NOTICE

Before changing from one steering mode to another, always center both the front and rear wheels.

Before you return to the Two-Wheel Steer mode or to the Circle Steer mode, the front wheels and rear wheels must be centered. Observe the rear axle position gauge (2) on the front console. Use the independent rear maneuvering switch (4) to center the rear wheels until the zero position is obtained. Then, move the All Wheel Steer switch to the desired mode.

Copyright 1993 - 2022 Caterpillar Inc.
All Rights Reserved.
Private Network For SIS Licensees.
Mon Aug 1 16:45:04 UTC+0530 2022

Product: BACKHOE LOADER
Model: 428D BACKHOE LOADER BMT
Configuration: 428D Backhoe Loader BMT01618-03227 (MACHINE) POWERED BY 3054 Engine

Operation and Maintenance Manual
424D, 428D and 438D Backhoe Loaders
Media Number -SEBU7400-02 **Publication Date -01/06/2006** **Date Updated -28/06/2006**

i01441067

Alternate Exit

SMCS - 7310

Illustration 1 g00754767

The cab door on the right side of the machine serves as an alternate exit. The cab door can be opened from the inside or from the outside. Pull the door latch on the outside of the cab door in order to open the cab door from the outside.

Illustration 2 g00287240

Move the lever on the inside of cab door in order to unlatch the cab door and open the cab door from the inside.

Copyright 1993 - 2022 Caterpillar Inc.
All Rights Reserved.
Private Network For SIS Licensees.

Product: BACKHOE LOADER
Model: 428D BACKHOE LOADER BMT
Configuration: 428D Backhoe Loader BMT01618-03227 (MACHINE) POWERED BY 3054 Engine

Operation and Maintenance Manual
424D, 428D and 438D Backhoe Loaders
Media Number -SEBU7400-02 **Publication Date -01/06/2006** **Date Updated -28/06/2006**

i01441661

Autoshift Control - If Equipped

SMCS - 1408; 3168; 4800; 7451-ZS

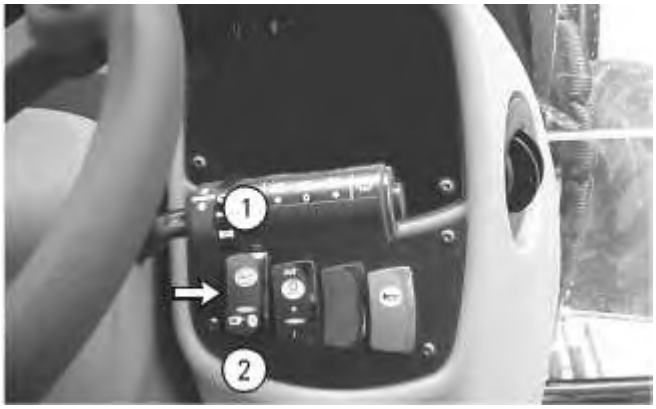


Illustration 1 g00733821

(1) Automatic Mode

(2) Manual Mode

Automatic Mode (1) - Push the top of the switch for the autoshift function in the automatic mode. Push the top of the switch prior to shifting the transmission into forward or reverse in order to activate the autoshift function. The operator selects the highest desired gear for the transmission with the transmission shift lever. The

control will then select the proper transmission gear according to the ground speed of the machine. Third gear may be skipped in the automatic mode under certain circumstances.

Manual Mode (2) - Press the bottom of the switch in order to prevent the transmission from automatically shifting into fifth gear when the transmission is in fourth gear. The position is also used for the manual mode of the transmission control.

Illustration 2 g00755953

The manual mode allows the operator to select the desired speed and the desired direction of the machine with the transmission shift lever (3).

Copyright 1993 - 2022 Caterpillar Inc.
All Rights Reserved.
Private Network For SIS Licensees.
Mon Aug 1 16:43:22 UTC+0530 2022

Product: BACKHOE LOADER
Model: 428D BACKHOE LOADER BMT
Configuration: 428D Backhoe Loader BMT01618-03227 (MACHINE) POWERED BY 3054 Engine

Operation and Maintenance Manual
424D, 428D and 438D Backhoe Loaders
Media Number -SEBU7400-02 **Publication Date -01/06/2006** **Date Updated -28/06/2006**

i01379295

Backhoe Auxiliary Control (Foot Operated) - If Equipped

SMCS - 5063

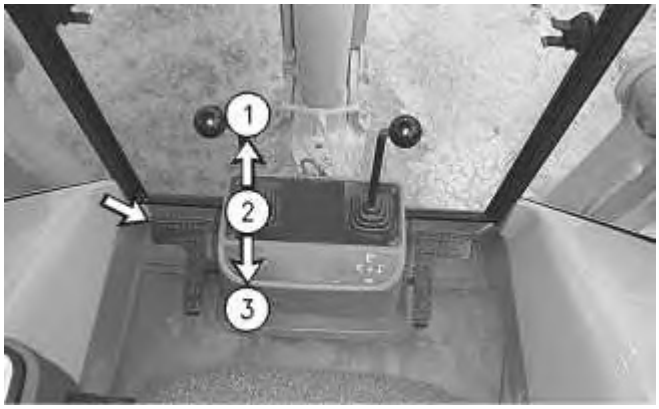


Illustration 1 g00733499

The auxiliary pedal is located on the left side of the console.

Use the auxiliary pedal in order to pressurize the hydraulic lines of a work tool.

Push down on the toe end of the pedal to position (1) in order to pressurize the hydraulic line on the right side of the stick.

HOLD (2) - The pedal will return to the HOLD position when the pedal is released from position (1) or released from position (3) .

Push down on the heel end of the pedal to position (3) in order to pressurize the hydraulic line on the left side of the stick.

Copyright 1993 - 2022 Caterpillar Inc.
All Rights Reserved.
Private Network For SIS Licensees.

Product: BACKHOE LOADER
Model: 428D BACKHOE LOADER BMT
Configuration: 428D Backhoe Loader BMT01618-03227 (MACHINE) POWERED BY 3054 Engine

Operation and Maintenance Manual
424D, 428D and 438D Backhoe Loaders
Media Number -SEBU7400-02 **Publication Date -01/06/2006** **Date Updated -28/06/2006**

i01379301

Backhoe Extendable Stick Control (Foot Operated)

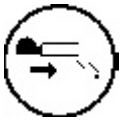
SMCS - 5063; 5474

Illustration 1 g00733497

The pedal for the extendable stick is located on the right side of the console.

STICK EXTEND (1) - Push down on the toe end of the pedal in order to extend the stick. Push down on the toe end of the pedal for additional reach with the stick.

HOLD (2) - The pedal will return to the HOLD position when the pedal is released from the STICK EXTEND position or from the STICK RETRACT position. Stick movement will stop.



STICK RETRACT (3) - Push down on the heel of the pedal in order to retract the stick.

This is the sample of the manual

Click on the download link for complete manual

Download Link